

WHAT IS CLAIMED IS:

1. A current density monitor and control system, comprising:
  - an electrostatic device that imparts an electrostatic field to a copy substrate, the electrostatic device comprising a current generation unit and a receptor opposite the current generation unit;
  - a current monitoring unit that monitors total dynamic current flowing from the current generation unit to the receptor;
  - an input unit that inputs the width of a copy substrate;
  - a storage unit that stores the constant parameters of the function of voltage applied to the current generation unit versus total dynamic current for the receptor;
  - a controller that determines voltage required to maintain a predetermined charge density in the copy substrate; and
  - a voltage control unit that adjusts the voltage of the current generation unit to the value determined by the controller.
2. The current density monitor and control system of claim 1, further comprising a feedback unit that measures actual current across the copy substrate and provides feedback as required to control the voltage of the current generation unit to maintain actual current density in the copy substrate substantially equal to desired current density in the copy substrate.
3. The current density monitor and control system of claim 1, further comprising a calibration unit that calculates and updates the function of voltage applied to the current generation unit versus total dynamic current for the receptor.
4. The current density monitor and control system of claim 3, wherein the calibration unit comprises:
  - a voltage input unit that progressively varies the voltage in the current generation unit through a predetermined range of values;
  - a monitor unit that measures total dynamic current to the receptor for discrete voltage values; and
  - a recording unit that records values for total dynamic current versus voltage applied to the current generation unit by overwriting the function of voltage applied to the current generation unit versus total dynamic current in the storage unit.

5. The current density monitor and control system of claim 1, wherein the input unit that inputs the width of a copy substrate is a manual input unit requiring operator interface.

6. The current density monitor and control system of claim 1, wherein the input unit that inputs the width of a copy substrate is an automatic unit which receives input regarding the width of the copy substrate from sensors in the copy substrate handling path.

7. The current density monitor and control system of claim 1, wherein the input unit, controller and voltage control unit respond quickly enough to modify the voltage applied to the current generation unit in response to a plurality of copy substrate widths presented in a single reproduction task.

8. An electrostatic image-producing device including the current density monitor and control system of claim 1.

9. A xerographic reproduction device including the current density monitor and control system of claim 1.

10. A digital photocopier including the current density monitor and control system of claim 1.

11. A method for current density monitor and control in a copy substrate of an electrostatic device, comprising:

inputting information indicating the width of the copy substrate;  
determining the voltage required to maintain a desired current density through the copy substrate and a receptor; and  
applying the determined voltage to the current generation unit to induce current across the copy substrate and receptor.

12. The method of claim 11, wherein determining the voltage required comprises accessing stored data for total dynamic current versus voltage applied to a current generation unit in order to obtain the voltage required to maintain a desired current density through the copy substrate.

13. The method of claim 11, further comprising a calibration function comprising:

varying the voltage applied to the current generation unit across a predetermined range of values with no copy substrate present;

measuring the total dynamic current to the receptor for discrete voltage values; and

recording or updating stored data for total dynamic current versus voltage applied to a current generation unit.

14. The method of claim 11, further comprising:  
measuring the actual current through the copy substrate; and  
providing feedback to adjust the voltage applied to the current generation unit to maintain the desired current density through the copy substrate.

15. The method of claim 11, further comprising:  
changing the width of the copy substrate between any consecutive unit of copy substrate in a single image reproduction task;  
determining the voltage applied to the current generation unit required to maintain the desired current density through the varied width of copy substrate; and  
applying the determined voltage to the current generation unit.

16. The method of claim 15, wherein changing the width of the copy substrate, determining the voltage required, and applying determined voltage to the current generation unit occurs between each new copy substrate.

17. The method of claim 11, wherein inputting information indicating the width of the copy substrate requires a manual input.

18. The method of claim 11, wherein inputting information indicating the width of the copy substrate occurs automatically from sensors in the copy substrate-handling path.

19. A storage medium on which is recorded a program for implementing the method of claim 11.